

*G1
cond'd.*

99 150. The chemical mechanical polisher of claim *149*,
further comprising means for enhancing transmission of light
passing between the polishing pad and the film on the substrate.

100 151. The chemical mechanical polisher of claim *150*,
wherein the means for enhancing transmission is a focusing
lens. --

REMARKS

Upon entry of the above amendment and the prior amendment filed on July 28, 1997, claims 17-35, 39-47, 53-60, 76-78 and 91-151 will be pending.

Claims 48-52, 61-73, 75, 79-90 will be canceled without prejudice in the current application since they have been refiled in a separate divisional application (filed on August 14, 1998) for purposes of an interference (as explained below).

Claims 17-35, 39-51, 53-58, 60, 66-72, and 75-78 have been allowed.

Claims 52, 59, 61-65 and 73 have been rejected under 35 U.S.C. § 112.

Claims 76-87 submitted July 28, 1997, have been renumbered as claims 79-90 by the PTO pursuant to 37 C.F.R. § 1.126. Said claims 79-90 have been copied from U.S. Patent No. 5,433,651 (hereafter "the Lustig '651 patent") for the purpose of an interference.

Claim 59 has been amended as suggested by the Examiner in a previous response filed July 28, 1997. The amendment is believed to be sufficient to overcome the rejection under 35 U.S.C. § 112.

Applicant appreciates the courtesy extended by Examiner

Lee in granting a personal interview to the undersigned on May 5, 1998. During the interview, Examiner Lee indicated that claims 17-35, 39-47 and 53-60 were allowable and patentably distinct from the claims of the Lustig '651 patent and could be allowed without an interference because these claims include specific structural elements not recited in the Lustig '651 claims.

In a subsequent telephone interview with the undersigned in June 1998, Examiner Lee indicated that apparatus and process claims which recite *interferometric detection* would also be patentably distinct from the claims of the Lustig '651 patent.

During another telephone interview with the undersigned on July 24, 1998, Examiner Lee also indicated that product-by-process claims which depend on the allowable process claims will also be allowable without an interference.

Therefore, claims 48-52, 61-73, 75 and 79-90, which according to Examiner Lee are not patentably distinct from the claims of the Lustig '651 patent, have been canceled and refiled in a divisional application on August 14, 1998 in order to institute an interference with the Lustig '651 patent. Applicant reserves the right to argue that those claims are patentably distinct.

Pending claims 17-35, 39-47 and 53-60 were indicated to be allowable and patentably distinct from the claims of the Lustig '651 patent. Therefore, claims 17-35, 39-47 and 53-60 are believed to be allowable without an interference proceeding.

New claims 91-151 have been added. Claims 76-78 and the newly added claims 91-151 recite interferometric detection. As agreed to in the telephone interviews, these claims are patentably distinct from the claims of the Lustig '651 patent, because the claims of the Lustig '651 patent do not recite

interferometry. Lustig '651 monitors the change in film thickness by monitoring the change in the ratio of the overall intensity of the reflected light to the overall intensity of the transmitted light. However, current claims 76-78 and 91-151 require detecting interferometric change in reflected light. Therefore, the pending claims 76-78 and 91-151 are patentably distinct from the claims of the Lustig '651 patent because monitoring based on interferometry is different than monitoring the change of the ratio of the intensity of the reflected light to the transmitted light.

Claims 91-151 are believed to be allowable over the prior art of record because the prior art neither teaches nor suggests directing light through a polishing pad in a CMP machine to monitor a film as it is being polished based on interferometric change in reflected light.

The added claims are supported throughout the present specification and figures, including by the particular portions of the specification indicated in the following table. No new matter has been added.

<u>Claim</u>	<u>Support found in specification</u>
91	Figure 4. Page 7, Line 21 - Page 8, Line 12; Page 14, Line 2 - Page 15, Line 6.
92	Page 7, Line 21 - Page 8, Line 12.
93	Page 7, Line 21 - Page 8, Line 12.
94	Page 7, Line 21 - Page 8, Line 12; Page 11, Line 2.
95	Page 7, Line 21 - Page 8, Line 12; Page 11, Line 2.
96	Page 7, Line 21 - Page 8, Line 12; Page 12, Lines 5-14.
97	Page 14, Lines 9-12.
98	Page 8, Line 7.
99	Page 9, Lines 17-20; Page 10, Line 26 - Page 11, Line 1.
100	Page 10, Lines 16-24.
101	Page 3, Lines 25-26; Page 10, Lines 16-18.
102	Page 6, line 13 - Page 7, line 7; Figures 1,2 and 4; Page 7, Line 21 - Page 8, Line 4; Page 14, Lines 2-24.

103	Figure 4. Page 7, Line 21 - Page 8, Line 12; Page 14, Line 2 - Page 15, Line 6.
104	Figure 4.
105	Page 7, Line 21 - Page 8, Line 12.
106	Page 14, Lines 19 - 24.
107	Page 9, Lines 17-20.
108	Page 10, Lines 16-18.
109	Figures 1 and 2; Page 7, Line 21 - Page 8, Line 12; Page 12, Lines 5-14.
110	Page 6, Lines 16-20.
111	Page 10, Line 6.
112	Figures 1 and 2; Page 10, Lines 1-9.
113	Page 10, Lines 1-4.
114	Page 12, Lines 5-14; Page 10, Lines 5-9.
115	Page 12, Lines 5-14; Page 10, Lines 5-9.
116	Figures 1 and 2; Page 12, Lines 5-9.
117	Figures 1 and 2; Page 2, Lines 3-16; Page 10, Lines 5-9; Page 12, Lines 5-9.
118	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
119	Figure 4; Page 14, Lines 2-24.
120	Page 1, Lines 2-9; Page 12, Lines 20-21.
121	Page 10, Lines 16-24.
122	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
123	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
124	Page 6, Line 21 - Page 7, Line 7; Figures 1,2 and 4; Page 1, Lines 6-9; Page 7, Line 21 - Page 8, Line 4; Page 14, Lines 2-24.
125	Figure 4. Page 7, Line 21 - Page 8, Line 12; Page 14, Line 2 - Page 15, Line 6.
126	Figure 4.
127	Page 7, Line 21 - Page 8, Line 12.
128	Page 14, Lines 19-24.
129	Page 9, Lines 17-20; Page 10, Line 26 - Page 11, Line 1.
130	Page 10, Lines 16-24; Page 11, Lines 2-5.
131	Figures 1 and 2; Page 7, Line 21 - Page 8, Line 12; Page 12, Lines 5-14.
132	Page 6, Lines 13-20.
133	Page 10, line 6.
134	Page 7, Line 22; Page 10, Lines 11, 14-15.
135	Page 10, Lines 1-4.
136	Page 12, Lines 5-14.
137	Page 10, Lines 5-9.
138	Figures 1 and 2; Page 12, Lines 5-9.
139	Figures 1 and 2; Page 2, Lines 3-16; Page 10, Lines 5-9; Page 12, Lines 5-9.

140	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
141	Page 14, lines 19-22.
142	Figure 4; Page 14, Lines 2-24.
143	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
144	Page 10, line 4.
145	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
146	Figures 1 and 2; Page 1, Lines 6-9; Page 12, Lines 5-9.
147	Figure 4; Page 14, Lines 2-24.
148	Page 10, Lines 16-18.
149	Page 14, Lines 9-12.
150	Page 14, Lines 14-15.
151	Page 11, Lines 20-21.

New claims 91-146 have been added to cover interferometry-based methods of polishing and CMP machines, e.g., for controlling CMP, including for the purpose of uniform polishing of a film over a substrate or to detect an endpoint (when a film has been sufficiently polished). The claims extend to products resulting from the practice of such methods, as well. In addition, the new claims cover continuous monitoring or discontinuous monitoring methods. The claims further cover illumination and detection at multiple sections of a film undergoing processing or single-section monitoring.

In addition, claims 147-151 have been added to cover one particular improvement in CMP machines disclosed for the first time in the present application, i.e., a CMP machine having at least one optical access in the polishing pad for purposes of real-time monitoring of a film being polished based on interferometric change in reflected light passing through the optical access.

In view of the above amendments and remarks, it is believed that all pending claims are in condition for allowance. In the event that any issues remain, the Examiner is invited to telephone the office of the undersigned if it would expedite

Serial No. 08/401,229

prosecution.

Respectfully submitted,

August 20, 1998

Date



Stephen B. Maebius
Reg. No. 35,264

FOLEY & LARDNER
3000 K Street, N.W., Suite 500
P.O. Box 25696
Washington, D.C. 20007-8696
(202) 672-5569